

Green Bond Issuance and Investors' Attention——Evidence Based on AH Shares

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Abstract: Based on the event research method, we found that unlike mature foreign markets, the issuance of green bonds on both the A-share market and the H-share market will cause a significant decline in stock prices, and the negative excess returns in the A-share market will be more intense. Our research does not support investor attention hypothesis of Merton (1987) . In China, an emerging market, this negative mechanism is more because the capital market does not recognize the high issuance and hidden costs of green bonds, and companies may face many constraints in actual investment afterwards. In addition, our research is still significant after adjusting the event window period and company heterogeneity.

1. Introduction

In recent years, with increasing domestic concerns about climate and environmental issues, the company's awareness of sustainable development and environmental protection has gradually strengthened, and the domestic green bond market has flourished. At present, China's issuance of green bonds ranks second in the world, after the United States. At the macro level, the issuance of green bonds by enterprises is conducive to supporting the development of domestic green industry projects and improving the environmental benefits of greenhouse gas emission reduction, pollutant reduction, resource conservation, and ecological protection ("Overall Plan of Ecological Civilization System Reform"), and it is of great significance to the construction of China's green financial system; And at the enterprise level, the issuance of green bonds can raise lower capital for enterprises, which will also have a certain impact on the stock prices of listed companies. Tang and Zhang (2018) studied the transmission mechanism of green bond issuance and capital market performance from the perspective of investor attention hypothesis of Merton (1987) by comparing the impact of global issuance of green bonds on company stock prices. In addition, there are many Scholars (Liu Xiaojun, 2017; Chen Danluo, 2018) studied the impact of issuing green bonds on stock prices in the A-share market. This article uses the event research method, taking the issuance of green bonds as an event, and calculating the cumulative average excess return rate by establishing a CAPM model to study the impact of the issuance of green bonds on the company's stock price in the A-share market and the H-share market , which are then compared. In the main experiment, we found that unlike mature foreign markets, the A-share market and the H-share market have significant negative reactions to the issuance of green bonds. In order to further study whether the conduction of this negative reaction is similar to the Investor Attention proposed by Tang and Zhang, we have further studied the first and subsequent issuance of green bonds by listed companies. Finally, it was found that when an enterprise issues green bonds for the first time and subsequently, the market will have a significant negative reaction, thus rejecting the transmission mechanism of Investor Attention. Our analysis believes that the issuance of green bonds will bring a lot of explicit and implicit issuance costs to the company, severely squeezing the company's operating cash flow, and restricting the company's future development while the environmental protection system is still incomplete, which has led to the significant negative reaction of the market.

2. Literature review

At present, many domestic scholars' research on green bonds mainly focuses on the definition of green (that is, the clear definition of the difference between green bonds and ordinary bonds) and the improvement of the regulatory system of green bonds. Experts from the "Greening China's Financial System" task group (2016) of the State Council Development Research Center believe that it is almost impossible to find a definition of "green finance" that is established under all conditions on a global scale. However, there should be a clear standard of green financial within a country. Wan Zhihong and Zeng Gang (2016) believe that for development of China's green bond market, it should clearly define the definition, certification and supervision of "green investment" and "green bonds". Fang Yixiang and Zhan Xiaoqing (2018) believe that the green bond standard is a criterion for measuring the "green attributes" of green bonds. Establishing a clear, clear and universal green bond standard system is the cornerstone to ensure the healthy and sustainable development of the green bond market.

Many scholars at home and abroad have focused on the impact of green bond issuance on listed companies. In the existing literature, Tang and Zhang (2018) first studied how stock prices and stock liquidity would change after listed companies issue green bonds, and proposed three transmission mechanism assumptions for the changes. The two scholars proposed the following hypothesis: (1) Issuing green bonds will cause the stock price to rise. (2) One of the channels for the issuance of green bonds on listed companies is through "Investor Attention" (Merton, 1987). They believe that when a listed company issues green bonds for the first time, it is equivalent to putting a "green label" on the company. The media's exposure to the company will greatly increase the company's visibility, thereby attracting attention of bond investors and stock investors, expanding the company's investor base. After the characteristic risk shared by each investor is reduced, their required rate of return is also reduced. According to the dividend discount model, the company's stock price will eventually rise. At the same time, they believe that this transmission mechanism only appeared when the company first issued stocks. When the company subsequently issued green bonds, because the company already had the "green" label, the subsequent issuance will not cause excessive market attention, and will not cause a significant increase in the company's stock price. After empirical analysis, it is finally verified that the issuance of green bonds will cause the stock price to rise, the transmission channels are Investor Attention and Fundamental, and the channel of Financing Cost is invalid. In China's capital market, scholars have not yet reached a consensus on the relationship between the issuance of green bonds and future stock returns. Liu Xiaojun (2017) used the event research method to study the short-term response of China's stock market to the issuance of green bonds by listed companies using the company's issuance of green bonds as an event, and finally found that the market had a negative response to the issuance of green bonds. Chen Danming (2018) also used the event research method to study the stock price effect of green bond issuance of Chinese listed companies. The difference is that he chose the listed company to issue green bond issuance announcement as the event, and finally found that the cumulative rate of return during the window period after the issuance of green bonds became a significant positive value from -4 days, indicating that the overall issuance of green bonds by domestic listed companies has a significantly positive stock price effect.

3. Status of China's green bond market

As of December 31, 2019, China had issued a total of 767 green bonds, with a total issuance amount of 1.72631418 trillion yuan, making it the world's second largest green bond issuer, only after the United States. As can be seen from the figure 1, following the first green bond issued by China Agricultural Development Bank in China in 2010, there has been no green bond issuance for five consecutive years from 2011 to 2015, and from the first quarter of 2016, the issuance of green bonds has been increasing year by year. The number of green bond issuances increased significantly in 2019. According to the "2019 Green Bond Operation Report" issued by China Lianhe Credit

Rating Co, a total of 192 green bonds were issued in China in 2019, with an issuance scale of 280.344 billion yuan(129th period, 220.853 billion yuan), increasing by 48.84% and 26.94% respectively.

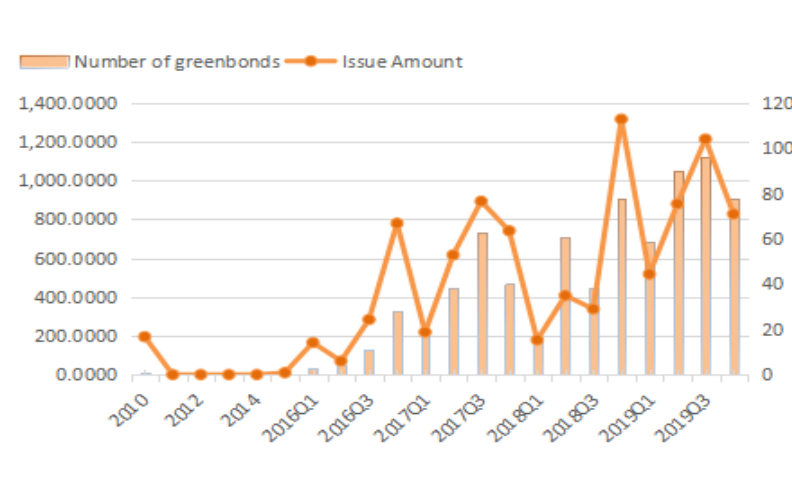


Figure 1 Green bond issuance amount and issuance quantity chart

Table 1 shows the statistical characteristics of 767 green bonds issued in China and Hong Kong (including 183 green bonds issued by listed companies). As can be seen from the table, the average coupon rate of all green bonds is 5.055%, while the coupon rate of green bonds issued by listed companies is slightly lower at 4.7431%; the average maturity of all green bonds is 5.040 years, while the average maturity of green bonds issued by listed companies is 4.1825 years; the average issuance of all green bonds is about 12.9 billion yuan, while the average issuance of green bonds issued by listed companies is 21.9 billion yuan. These characteristics also indicate from the side that green bonds issued by listed companies are more popular with investors.

Table 1 Summary of green bond characteristics

Bond Characteristics	Mean	Median	Std	N
All green bonds				
Coupon(percent)	5.055	4.9	1.338	767
Maturity(year)	5.04	5	2.859	767
Amount(million)	1290.68	600	2750	767
Public issuers' green bonds				
Coupon(percent)	4.7431	4.58	1.51654	183
Maturity(year)	4.1825	3.0027	1.97946	183
Amount(million)	2190.45	962.5	4610.339	183

In the chart below, we report companies with green bond debt entities in China. As shown in Figure 2, according to the first-level classification of Wind bonds, asset-backed securities account for the largest proportion of the 767 green bonds issued to date, accounting for 35% of the total number of issued bonds, followed by corporate bonds and corporate bonds(see Figure 3). Among all the green bonds issued, the duration of debt is relatively concentrated, mainly with medium-term bonds of one to ten years. Among them, the number of medium-term bonds accounted for about 94% of the total issuance.



Figure 2 Wind bond primary classification Figure 3 Green bond maturity

4. Model building and result analysis

4.1. Data sources and processing

This article obtained data from the Wind Economic Database from the issuance of the first green bond in China in 2011 to the total issuance of 767 green bonds in Mainland China and the Hong Kong Special Administrative Region in 2019. The specific time range is from August 2010 to December 2019. The data includes data such as the issue date, issuance amount and coupon rate of green bonds. All the companies we selected are listed companies and debtors that are in the country but listed on the mainland A-share market or the Hong Kong market. Due to the need to study the impact of the issuance of green bonds on the stock prices of listed companies, We obtained the stock prices of A-share and H-share listed companies that issued green bonds from the CSMAR database and the daily rate of return considering the cash dividend reinvestment to establish the CAPM model to calculate the excess rate of return; and obtained the market value factor (SMB) and book market value ratio factor (HML) data of these companies to use the Fama-Fench three-factor model to calculate the excess rate of return for analysis. The A-share market's market rate of return uses the CSI 300 index's daily rate of return, and the risk-free rate uses the daily risk-free rate downloaded from CSMAR; the H-share market's rate of return uses the Hang Seng Index's daily rate of return, the risk-free interest rate is HIBOR, which is the interbank interest rate of Hong Kong banks. The factor data for the Hong Kong market comes from the Asia-Pacific factor database provided by Kenneth French.

In the process of processing data, for some companies that issued green bonds before listing, because they could not study the impact of the first issuance of green bonds on the stock prices of these companies, they were discarded from the original panel data set during cleaning ; In addition, we also exclude some companies established in China but listed on foreign exchanges and companies that have been delisted; the final clean data obtained are: A-share listed companies are 41, H-share listed companies are 23 companies.

4.2. Model building

This article uses the event research method to study the impact of the specific event of green bond issuance on the stock prices of the corresponding A-share listed companies and H-share listed companies by calculating the cumulative average abnormal return rate during the period before and after the issuance of green bonds. Similarities and differences.

In the main experiment based on the event research method, we selected listed companies to issue green bonds as the researched event, and the event day is the listed company's announcement and issue date. Considering that the short estimation period will make the estimation result inaccurate, so 120 days to 20 days before the issuance of green bonds is selected as the estimation period of the event research method; and for the event period window, this paper selects (-5, 5) Window to study the impact of issuing green bonds on the cumulative average abnormal yield.

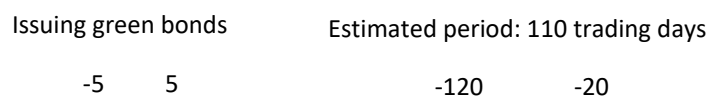


Figure 4 Model estimation period and time window period

Next, we calculate the excess return of the stock. When calculating the excess return of stocks, two models are used: CAPM model and Fama-French three-factor model.

The CAPM model is established as follows:

$$R_{i,t} - R_{f,t} = \alpha + \beta(R_{m,t} - R_{f,t}) + \varepsilon_{i,t}$$

Among them, $R_{i,t}$ is the return rate of individual stock listed company considering the cash dividend reinvestment on day t, $R_{f,t}$ is the risk-free interest rate on day t, and $R_{m,t}$ is the market

return rate on day t . For the market model (Jensen, 1967), we used the data from 120 days before to 10 days before the issuance of green bonds by a single listed company as the estimation window, estimated the coefficient of the above model α and β , and used this coefficient to calculate the normal rate of return and excess during the window rate of return. Among them, the excess rate of return is:

$$AR_{i,t} = R_{i,t} - \alpha - \beta(R_{m,t} - R_{f,t}) \quad (1)$$

Calculate the average excess return rate AAR_t of n companies on day t as follows:

$$AAR_t = \frac{\sum_{i=1}^n AR_{i,t}}{n} \quad (2)$$

Thus the cumulative excess return rate can be obtained

$$CAR_t = \sum AAR \quad (3)$$

In addition, we also established the Fama-French three-factor model (Fama and French, 1993) as

$$R_{i,t} - R_{f,t} = \alpha + \beta(R_{m,t} - R_{f,t}) + s_iSMB_t + h_iHML_t + \varepsilon_{i,t} \quad (4)$$

Among them, SMB_t is the simulated portfolio return rate of the market value (Size) factor on day t , and HML_t is the simulated portfolio return rate of the book-to-market factor at time t , similar to the CAPM model, we use the estimated period of each listed company to estimate the data α , β , s_i and h_i in above model, so as to calculate the normal rate of return and excess rate of return during the window period. Among them, the excess rate of return is as follows

$$AR_{i,t} = R_{i,t} - \alpha - \beta(R_{m,t} - R_{f,t}) - s_iSMB_t - h_iHML_t \quad (5)$$

For the excess returns obtained by the three-factor model, we repeatedly calculate the cumulative excess returns through equations (2) and (3).

We uses the above two models to calculate the average excess return rate and cumulative excess return rate for the full sample of A shares and the full sample of H shares to test whether the issuance of green bonds has a positive impact on the company's stock price; for investors' concerns raised by Tang and Zhang in this paper, based on the event that the sample listed company issues green bonds for the first time, it calculates AAR and CAR during the window period to verify whether the hypothesis is established in the A-share market and the Hong Kong stock market. For the CARs calculated by the above two models, SPSS software was used for significance test. Our original hypothesis is that CAR is significantly 0, that is, the issuance of green bonds has no significant effect on the stock price of listed companies. If the original hypothesis is rejected, no issuance of green bonds will have a significant impact on the company's future capital market performance. In addition, this paper separately calculates the cumulative average excess return rate during the window period for the first green bond issued by the listed company and the subsequent green bond issuance of the listed company, and performs a significance test to verify that whether the transmission mechanism Investor Attention is established in China.

4.3. Empirical results

In the main experiment, the cumulative average excess returns of the A-share and H-share samples calculated according to the above model and the t value of the significance test are summarized as follows:

Table 2 A-share and H-share cumulative average excess return test results

Event (full sample)	T value	P value
Green bonds issued by A shares (CAPM)	-9.766	0
H shares issue green bonds (CAPM)	-4.548	0
Green bonds issued by A shares (FF-three factors)	-8.364	0
H shares issue green bonds (FF-three factors)	-4.983	0

4.3.1. Impact of green bond issuance on stock prices

It can be seen from Table 2 that, unlike Tang and Zhang's global empirical results, in China, the issuance of green bonds by A-share listed companies has not caused a significant increase in stock prices. On the contrary, when the significance level is 5%, the excessive cumulative returns of green bond stocks have dropped significantly in the next 5 days. Even in Hong Kong stock market which has more robust market mechanism and is more effective, the issuance of green bonds did not cause the share price to rise, but showed similar characteristics as the A-share market.

In addition, we report in Table 3 the cumulative average excess return rate (full sample) of green bonds issued by listed companies in the A-share market and H-share market during the window period calculated based on the CAPM model respectively.. It can be seen from the figure that after the issuance of green bonds, the cumulative average excess return of stocks of listed companies in both markets is less than 0, but the trend of change is different. In the A-share market, from the first five days to the first three days of the issuance of green bonds, the cumulative average excess yield has been showing a downward trend, reaching a minimum value of -0.11% on the third day, after which the yield began to reverse and was issued. The green bond reached a maximum point on the first day. After the incident, it continued to decline on the second and third days, and rebounded on the fourth and fifth days. Correspondingly, in the H-share market, although the cumulative average excess return during the window period after issuing green bonds is also negative, but unlike the A-share market, the cumulative excess return rate in the H-share market is significantly greater than that in the A-share market. And there is only one inflection point, basically showing an increasing trend in the release (-5, 1), and then showing a downward trend.

Table 3 A-share and H-share total sample excess return rate

Time	Cumulative average excess return rate of A shares	Cumulative average excess return rate of H shares
-5	-0.037587064	-0.020215904
-4	-0.04303231	-0.010058354
-3	-0.112512079	-0.006867284
-2	-0.105354352	-0.008008791
-1	-0.085541245	-0.006183445
0	-0.071403312	-0.004879641
1	-0.055298473	-0.001872087
2	-0.071943777	-0.002709628
3	-0.090129529	-0.00409381
4	-0.063981433	-0.005149665
5	-0.053932698	-0.005293302
T	-9.766	-4.548

According to Tang and Zhang's Investor Attention theory, the first issuance of green bonds will label the company as "green", and the media will increase its exposure to the company at that time, which will increase the company's attention and cause investors to increase their attention. The purchase of company stocks has driven up stock prices. Through the above research, it is found that the issuance of green bonds by listed companies in the A-share market and the H-share market will

not cause the share price to rise. In order to investigate whether there is a reverse transmission mechanism similar to Investor Attention in the A-share market and the H-share market, taking the sample company's first issuance of green bonds and subsequent issuance of green bonds as events, the CAPM model was established to calculate the issuance of green bonds Cumulative average excess return rate during the window period.

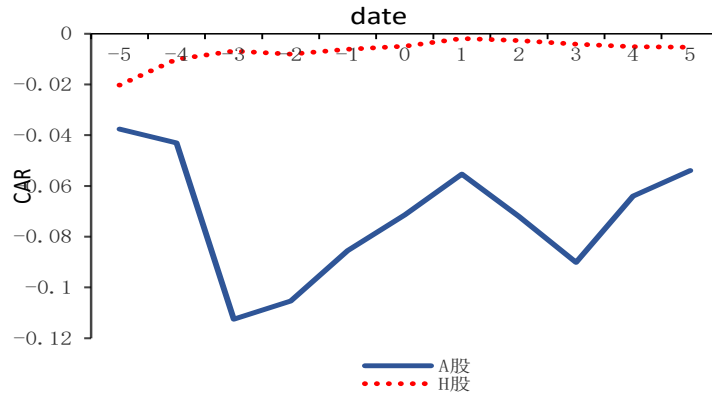


Figure 6 Cumulative excess return rate of the entire sample of a shares and H shares

We plot the excess returns of stocks when listed companies first issue green bonds in Figures 7 and 8, and the CARs after listed companies issue green bonds on the basis of the issuance. It can be seen from Figure 7 that, similar to the full sample results, the cumulative excess return rate of H-share listed companies is still significantly greater than the cumulative excess return rate of A-share listed companies. The cumulative average excess return rate rose a few days ago. After the first day, the cumulative average excess return rate reversed. It is worth noting that, unlike the cumulative average excess return rate of the entire H-share sample during the window period, which has been negative, the chart below shows a positive average excess return rate on the first and second days. In the A-share market, CAR still reached the minimum value on the third day, and reached the maximum value on the first day. After reaching the maximum value, and then reached the minimum value on the second day, CAR has shown an increasing trend. The conclusion of subsequent release research in the Hong Kong market is consistent with Tang and Zhang (2015), proving that there may be cumulative excess returns in the Hong Kong market caused by investor attention.

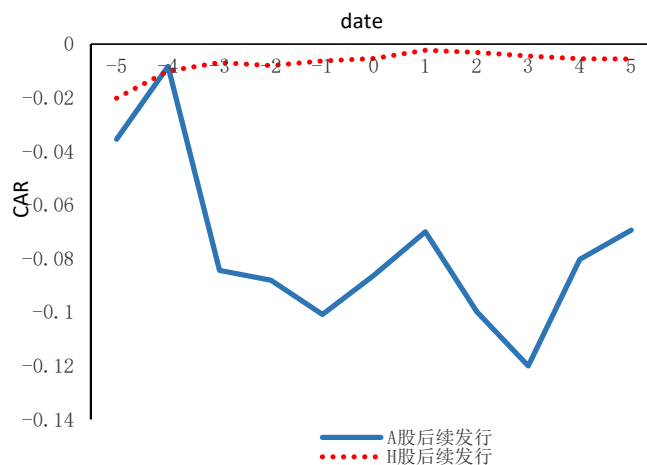


Figure 7 Accumulated excess returns of the first issuance of green bonds by a shares and H shares

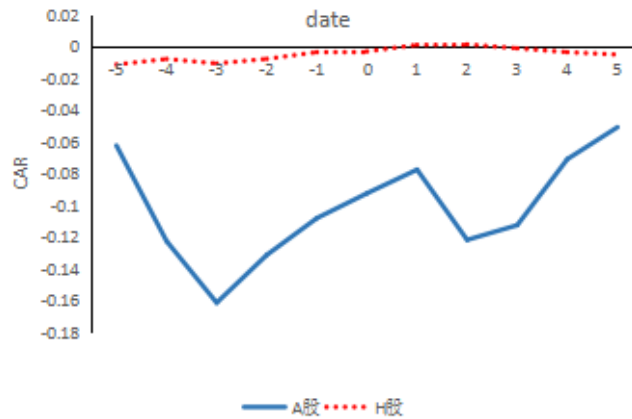


Figure 8 Cumulative excess yield of subsequent issuance of green bonds by a shares and H shares

Figure 8 is a line chart of the cumulative excess yield of subsequent green bond issuance of a shares and H shares. As can be seen from the above figure, during the window period of subsequent green bond issuance, the cumulative average excess of a shares and H shares is still negative, and the change pattern is similar to the full sample and the first issuance of green bonds.

Table 4

Event	T value	P value
First issue of A shares	-10.008	0.000
Subsequent issuance of A shares	-8.137	0.000
First issue of H shares	-3.464	0.006
Subsequent issuance of H shares	-4.857	0.001

Table 4 shows the t value and probability of the first and subsequent issuance of green bond CARs for A shares and H shares. The selection significance level is 5%, the original hypothesis is $CAR = 0$, and the alternative hypothesis is that CAR is not equal to 0. As can be seen from the above table, under the premise that the significance level is 5%, the original hypothesis is rejected, which means that the first and subsequent CARs of the A-share and H-share markets do not equal 0.

4.4. Empirical analysis

Tang and Zhang (2015) used the event research method to find that, the issuance of green bonds would cause a significant increase in the CAR of listed companies globally, and further studied the transmission mechanism of stock price increases. In the research of this article, we found that in the A-share market and the H-share market, the issuance of green bonds does not seem to be good news for the stock price. The main reasons for analysis are as follows:

(1) The capital market does not recognize the high issuance costs and other hidden costs of green bonds. On the one hand, although the government has formulated many preferential policies for the issuance of green bonds, such as relaxing access conditions and tax reductions and discounts on green bonds, but only a few meet the preferential conditions. Most bond issuers still face high issuance costs. On the other hand, green bonds face greater risk costs. Due to the special nature of green bonds, the funds raised must be used for green industry projects. Such projects have the obvious characteristics of long investment cycle and great uncertainty, and there may be project construction risks and capital risks during the project construction process, thereby reducing the issuer's ability to repay. In addition to the hidden risk costs, in order to ensure that the bonds issued by them meet the "green" standards, they will also hire a professional third-party evaluation agency to evaluate and certify the bonds, which will undoubtedly increase the number of issuers and the cost of information gathering and information disclosure. The high cost of debt will severely squeeze the cash flow of listed companies that are not sufficiently ample, which will further reduce their after-tax profits.

(2) The company may face many constraints in actual investment. Unlike ordinary bonds, green

bonds are subject to many restrictions in the process from issuance to capital use and project construction. The funds raised by green bonds can only be directed to invest in green bond projects disclosed by the company in the prospectus in advance, and cannot be used for other purposes. The use of green bond funds is very limited. During the construction of the project, the issuer should regularly disclose the use of funds and the benefits of green projects. Many restrictions in the actual investment process make the green bond funds unable to achieve the expected returns in the actual use process.

(3) The level of domestic awareness and acceptance of green bonds is not high. On the one hand, compared with some developed countries, China's green bond market started late, and society lacks the concept of green investment. Investors are skeptical about the definition and use of green bonds; in addition, due to the current lack of credible third-party assessment agencies in China, investors also lack confidence in green bonds. Regulatory and institutional flaws have also increased investors' risk, thereby reducing investors' acceptance of green bonds. For example, very few companies are currently required to disclose environmental information compulsorily, and most of them disclose voluntarily. Among these disclosed companies, there are also shortcomings such as insufficient disclosure of information. On the other hand, there are many retail investors in China, and these investors often lack some basic financial knowledge, so it is impossible to make a correct understanding of green bonds, so the psychological expectation that issuance of green bonds is not good news like foreign investors.

In order to further study whether listed companies issuing green bonds in the A-share and H-share markets also have a transmission mechanism similar to investor attention, this paper also studies the first and subsequent issuance of green bonds. According to the theory of investor attention, only the first issuance of green bonds will attract investors' attention through media exposure, and subsequent issuance of green bonds will not increase investors' attention, and CAR will be equal to zero. In the empirical results of this article, we found that the CARs caused by the first and subsequent issuance of green bonds are not equal to 0 and are negative, which means that investors' attention is not the cause of the changes in the cumulative excess returns of listed companies.

5. Policy suggestion

5.1. Introduce preferential policies

Through the formulation of a series of preferential policies, the attractiveness of green bonds will be enhanced. Encourage local governments to encourage the issuance of local green bonds and the construction of environmental protection projects by discounting interest rates, lowering interest income taxes, and setting up special funds to reduce the cost of bond issuance. The government subsidizes or guarantees green bonds, externally increases credit for green bonds, increases the value of green assets, and increases the enthusiasm for green bond issuance.

5.2. Improve the third-party evaluation mechanism

Based on the current international green bond standards and the development status of green finance in China, a unified green bond definition standard is formulated to achieve the compatibility of domestic and foreign standards. Formulate clear third-party identification methods and specifications, establish a third-party assessment mechanism industry association, and improve the professionalism of domestic green bond certification. Improving the third-party evaluation mechanism can reduce the risk cost of green bonds on the one hand, and improve the credibility of green bonds on the other hand, and make investors prefer green bonds.

5.3. Develop a strict green bond information disclosure system

In the process of green project construction, companies are obliged to disclose the use of green bonds funds and project construction, reduce information asymmetry, improve information transparency, and maximize the environmental benefits of green bonds.

6. Conclusion

Based on the event research method, this paper studies whether the issuance of green bonds by listed companies affects the performance of listed companies' stock price and capital market attention. Through the establishment of the CAPM model and the Fama-French three-factor model, we calculated the cumulative average excess rate of return of green bonds issued by A-share and H-share listed companies during the window period. Significant negative impact, and the negative reaction of the A-share market is more intense. In order to investigate whether this influence mechanism is similar to the investor concern hypothesis proposed by Tang and Zhang (2015), we separately calculated the cumulative average excess returns of the sample company's first and subsequent green bond issuance. It is found that investors' attention caused by the issuance of green bonds in China will not cause excessive reaction in the capital market. After analysis, this paper believes that the main reasons for the domestic stock market's negative reaction to the issuance of green bonds are as follows: (1) The capital market does not recognize the high issuance costs and other hidden costs of green bonds; (2) The company's actual investment in China may face many constraints. The funds raised using green bonds can often only be applied to industries with low returns, but they cannot take advantage of industrial capital investment; (3) The level of domestic awareness and acceptance of green bonds is not high, investors do not pay much attention to whether a company issues green bonds; on the contrary, in the more developed Hong Kong market, the effect of investor attention may be stronger. The specific transmission mechanism of the impact of domestic green bond issuance on stock prices remains to be studied. At the end of this article, we have put forward a few policy recommendations in response to various problems in the domestic green bond market.

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